direct to C02 must be equal to the sum of the quantities of heat which will result if the same kilogramme C is first burnt into CO and the resultant CO subsequently is burnt into COa, for the amounts of the mutually reacting substances are the same at the conclusion. Since, further, in the second case the action ensues in two steps, wherein in each step the same amount of oxygen is employed, one might assume that in each of these separate operations the same quantity of heat would be set free, that is to say, that the combustion of 1 kilogramme C to CO would liberate as much heat as the combustion of the resultant carbon monoxide into carbonic acid.

Now the latter quantity of heat admits of comparatively easy experimental estimation, and has been established as being 3,063 calories per cubic metre CO at 0°) and 760 millimetres. From this, one obtains from—

Calories. 1*86 cubic metre CO and O93 cubic metre 0,
1*86x3,063 5,693

And one would obtain from the combustion of 1
kilogramme C with 0-93 cubic metre 0 to l'S6
cubic metre CO likewise . . . . . 5,693 Which would give
for the total energy derived from
1 kilogramme 0 . . . . - . . , . 11,386 Practical
determinations of the heat of combustion
of carbon have, however, established an amount of 8,080
So that a deficit appears of.....3,306

This difference in the estimation of the heat of combustion is explained in that the carbon is always employed in the solid phase, whilst in the products carbon .monoxide and carbonic acid, it is present in the gaseous phase* An expenditure of energy is required for its transmutation into the gaseous condition, and therefore one assumes that the energy in question for 1 kilogramme carbon amounts to the before-mentioned 3,306 calories. Consequently, an energy content of 11,386 calories represents the combustible value of theoretically imagined gaseous carbon, which, for practical purposes, does not enter into consideration. The practicably available energy for 1 kilogramme carbon amounts to only 8080 calories, and this must be completely disengaged and likewise must be rendered fully evidenced in the products of combustion in the form of disengaged, or heat proper, and of latent heat or